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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/832,410 | 04/10/2001 | Timothy Schmidl | TI-30895 | 9531 |
| 23494 | 7590 | 09/07/2004 | EXAMINER | |
| TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265 | | | | WANG, TED M |
| | | ART UNIT | | PAPER NUMBER |
| | | 2634 | | |

DATE MAILED: 09/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 09/832,410 | SCHMIDL ET AL. | |
| | Examiner | Art Unit | |
| | Ted M Wang | 2634 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 10 April 2001.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-12 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) 5 and 6 is/are allowed.
 6) Claim(s) 1-3 and 9-12 is/are rejected.
 7) Claim(s) 4,7 and 8 is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-12 are pending in the application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 9-12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In regard claims 9-12, the "channel analyzer" and "signal generator" have not been taught in the specification. The specification and the drawing Fig.6 only teaches a transceiver with block diagram indicating the channel estimation, eigenvector weighting, eigenvector combiner, eigenvector detector, and modulator, demodulator, power amplifier, and low noise amplifier but not "channel analyzer" and "signal generator" as recited.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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- Claim 10 line 6 "step (a)" is indefinite since claim 9 step (a) does not generate any result.

Claim Objections

6. Claims 7, 8, and 10-12 are objected to because of the following informalities:

- In regard claim 7, line 2 "(a)" should be changed to "(d)", line 5 "(b)" should be changed to "(e)", and line 6 "(a)" should be changed to "(d)".
- In regard claim 8, line 2 "(a)" should be changed to "(b)".
- In regard claim 10, line 2 "(a)" should be changed to "(b)", line 4 "(b)" should be changed to "(c)".
- In regard claim 11, line 2 "(a)" should be changed to "(b)".
- In regard claim 12, line 2 "(a)" should be changed to "(c)".

Examiner suggests the applicant to check the similar issues for all claims.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical

Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

8. Claim1 is rejected under 35 U.S.C. 102(e) as being anticipated by Harrison (US6,067,324).

- In regard claim 1, Harrison discloses a method for transmitting and demodulating a communications signal using an adaptive antenna array in a wireless communication system with
 - (a) estimating at least one eigenvector of a matrix of communication channel coefficients for a channel between a first plurality of antennas and a second plurality of antennas (Fig.1 elements 100-122, column 2 line 41 – column 4 line 67, Fig.2 elements 201-216, and column 5 lines 1-63); and
 - (b) transmitting using said first plurality of antennas with the relative weightings of baseband signals on said first plurality of antennas corresponding to components of said at least one eigenvector (column 3 line 11 – column 4 line 67).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrison (US6,067,324) in view of Gerlach et al. (US5,471,647).

- In regard claim 2, Harrison discloses all of the limitation as described in the above paragraph except specifically teaching that (a) said communication channel has MN coefficients, a_{ij} for $i = 1, \dots, M$ and $j = 1, \dots, N$ where M and N are positive integers, and a_{ij} relates to transmission from the i th antenna of a transmitter to the j th antenna of a receiver, and said matrix is CC^H where C is the $M \times N$ matrix with i th row and j th column entry a_{ij} and H is Hermitian conjugate. Gerlach et al. discloses a method for minimizing cross-talk in adaptive transmission antennas that said communication channel has MN coefficients, a_{ij} for $i = 1, \dots, M$ and $j = 1, \dots, N$ where M and N are positive integers (Fig.1 elements 15(1...n, 1)-15(1...n, m), Fig.3a and 3b elements 13(1...n, 1)-13(1...n, m), column 2 line 59 –column 3 line16, column 3 lines 39-63), and a_{ij} relates to transmission from the i th antenna of a transmitter to the j th antenna of a receiver (column 3 line 64 – column 4 line 54), and said matrix is CC^H where C is the $M \times N$ matrix with i th row and j th column entry a_{ij} and H is Hermitian conjugate (column 4 line 1 – column 5 line 41) in order to improve the receiving quality by reducing cross-talk.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Harrison's wireless communication system in view of Gerlach's disclosure by adapting feedback signals (32) to optimize the directional properties of information signals (19) with respect to their

intended receivers (16), where information signals (19) are applied to the transmitting elements (14) of a transmitting antenna array (12) in order to improve the receiving quality by reducing cross-talk.

- In regard claim 3, the limitation of (a) said signals on said antennas are a superposition of first signals weighted according to a first eigenvector of CC^H plus second signals weighted according to a second eigenvector of CC^H wherein the superposition depends upon first and second eigenvalues of CC^H can further be taught by Gerlach et al. in Fig.Fig.3a and 3b elements 16(1)-16(m), 32(1)-32(m), 40, 13(1...n,1)-13(1...n,m), 17(1)-17(m), and 19(1)-19(m), and column 3 line 39 – column 5 line 41).

Allowable Subject Matter

11. Claim 5 and 6 are allowed.
12. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
13. Claims 7 and 8 would be allowable if rewritten or amended to overcome the objection set forth in this Office action.
14. The following is an examiner's statement of reasons for allowance.
 - The prior art fails to teach a method of independent Claim 5 that specifically comprise the followings
 - said linear combinations of said signals maximize the minimum distance between received different signals at a receiver as recited;

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Harrison (US6,067,324) and Gerlach et al. (US5,471,647) disclose all of the limitation except the above features.

Conclusion

15. Reference US6,091,361 and An efficient adaptive algorithm for the direction-of-arrival (DOA) estimation utilizing the solution of extreme eigenvalue problem, Choi, S.; Bae, H.D.; Sarkar, T.K.; Antennas and Propagation Society International Symposium, 1991. AP-S. Digest , 24-28 June 1991, Pages:376 - 379 vol.1 are cited because they are put pertinent to the wireless communication with antenna array. However, none of references teach detailed connection as recited in claim.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M Wang whose telephone number is (571) 272-3053. The examiner can normally be reached on 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Ted M Wang
Examiner
Art Unit 2634

Ted M. Wang



SHUWANG LIU
PRIMARY EXAMINER